

a film formation apparatus provided for forming a[n amorphous] non-single crystal silicon film on a substrate by a chemical vapor deposition method in (said chamber) ^{apparatus} ~~lacks antecedent~~

a laser processing apparatus for irradiating said silicon film with a laser light for crystallizing said silicon film after forming said [amorphous] non-single crystal silicon film, ^{112, 2nd ¶}

D 1 a [preliminary] vacuum chamber [interposed between] (commonly ⁷ connected to said film formation [chamber] apparatus and said laser processing [chamber] apparatus, and

a mechanism for transporting said substrate from said film formation apparatus to said laser processing apparatus through said preliminary ^{vacuum} chamber without exposing said substrate to outside air,

^{shape of beam apparatus} said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates said non-single crystal silicon film.

D 2 12. (Twice Amended) The apparatus of claim 8 wherein said laser [processing apparatus comprises a chamber and a laser] is placed outside said chamber, said chamber having a window through which [a line] said rectangular-shaped laser beam having an elongated cross section is introduced into said chamber.

^{Sub A11} D 3 16. (Twice Amended) An apparatus for processing a semiconductor provided on a substrate comprising:
a [preliminary] vacuum chamber;

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an ion introducing apparatus connected [with] to said [preliminary] vacuum chamber for doping a semiconductor layer formed on a substrate with a dopant impurity;

a laser processing apparatus connected to said ion introducing apparatus through said [preliminary] vacuum chamber for treating said semiconductor layer with a laser light after said doping[.]; and

[wherein said preliminary chamber is provided with] a mechanism provided to said vacuum chamber for transporting said substrate from said ion introducing apparatus to said laser processing apparatus without exposing said substrate to the air,

said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates said non-single crystal silicon film.

Sub 117 17. (Twice Amended) The apparatus of claim 8 wherein said laser [processing apparatus comprises a chamber and a laser] is placed outside said chamber, said chamber having a window through which [a line] said rectangular-shaped laser beam having an elongated cross section is introduced into said chamber.

Please add new claims 26-73 as follows:

--26. An apparatus for processing a semiconductor provided on a substrate comprising:

a film formation apparatus provided for forming a non-single crystal silicon film on a (substantially square) substrate by a chemical vapor deposition method in (said chamber);

a laser processing apparatus for irradiating said silicon film with a laser light for crystallizing said silicon film after forming said non-single crystal silicon film;

a vacuum chamber commonly connected to said film formation apparatus and said laser processing apparatus, and

a mechanism for transporting said substantially square substrate from said film formation apparatus to said laser processing apparatus through said preliminary chamber without exposing said substantially square substrate to outside air,

D4 said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates said non-single crystal silicon film on said (substantially square) substrate.

27. The apparatus of claim 26, wherein said substantially square substrate is glass.

28. The apparatus of claim 26 wherein (said substantially square) substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

112 29. The apparatus of claim 26, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

30. The apparatus of claim 26 wherein said laser processing apparatus further comprises a sample holder for moving said substantially

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square) substrate in a direction orthogonal to said rectangular-shaped laser beam.

31. The apparatus of claim 26 wherein said laser processing apparatus further comprises a sample holder and said sample holder includes a heater for heating said (substantially square) substrate.

32. An apparatus for processing a semiconductor provided on a substrate comprising:

D⁴ a film formation apparatus provided for forming a non-single crystal silicon film on a (substantially square) substrate by a chemical vapor deposition method in said chamber;

a laser processing apparatus for irradiating said silicon film with a laser light for crystallizing said silicon film after forming said non-single crystal silicon film;

a vacuum chamber commonly connected to said film formation apparatus and said laser processing apparatus, and

a mechanism for transporting said substantially square substrate from said film formation apparatus to said laser processing apparatus through said preliminary chamber without exposing said substantially square substrate to outside air,

said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates said non-single crystal silicon film on said (substantially square) substrate and wherein said rectangular-shaped laser beam has a length greater than a width of said (substantially square) substrate.

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33. The apparatus of claim 32, wherein said substantially square substrate is glass.

34. The apparatus of claim 32 wherein said substantially square substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

35. The apparatus of claim 32, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

36. The apparatus of claim 32 wherein said laser processing apparatus further comprises a sample holder for moving said substantially square substrate in a direction orthogonal to said rectangular-shaped laser beam.

37. The apparatus of claim 32 wherein said laser processing apparatus further comprises a sample holder and said sample holder includes a heater for heating said substantially square substrate.

38. An apparatus for processing a semiconductor provided on a substrate comprising:

a film formation apparatus provided for forming a non-single crystal silicon film on a substrate by a chemical vapor deposition method in (said chamber);

a laser processing apparatus for irradiating said silicon film with a laser light for crystallizing said silicon film after forming said non-single crystal silicon film;

a vacuum chamber commonly connected to said film formation apparatus and said laser processing apparatus, and

a mechanism for transporting said substrate from said film formation apparatus to said laser processing apparatus through said preliminary chamber without exposing said substrate to outside air,

said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam irradiates the whole surface of the substrate including said non-single crystal silicon film.

D4 39. The apparatus of claim 38, wherein said substrate is glass.

40. The apparatus of claim 38 wherein said substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

41. The apparatus of claim 38, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

42. The apparatus of claim 38 wherein said laser processing apparatus further comprises a sample holder for moving said substrate in a direction orthogonal to said rectangular-shaped laser beam.

43. The apparatus of claim 38 wherein said laser processing apparatus further comprises a sample holder and said sample holder includes a heater for heating said substrate.

44. An apparatus for processing a semiconductor provided on a substrate comprising:

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a film formation apparatus provided for forming a non-single crystal silicon film on a substrate by a chemical vapor deposition method in said chamber;

a laser processing apparatus for irradiating said silicon film with a laser light for crystallizing said silicon film after forming said non-single crystal silicon film;

a vacuum chamber commonly connected to said film formation apparatus and said laser processing apparatus, and

a mechanism for transporting said substrate from said film formation apparatus to said laser processing apparatus through said preliminary chamber without exposing said substrate to outside air,

said laser processing apparatus comprising a chamber, a gas inlet and exhaust means for controlling pressure and atmospheric composition within said chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates the non-single crystal silicon film.

45. The apparatus of claim 44, wherein said substrate is glass.

46. The apparatus of claim 44 wherein said substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

47. The apparatus of claim 44, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

48. The apparatus of claim 44 wherein said laser processing apparatus further comprises a sample holder for moving said substrate in a direction orthogonal to said rectangular-shaped laser beam.

49. The apparatus of claim 44 wherein said laser processing apparatus further comprises a sample holder and said sample holder includes a heater for heating said substrate.

50. An apparatus for processing a semiconductor provided on a substrate comprising:

a vacuum chamber;

an ion introducing apparatus connected to said vacuum chamber for doping a semiconductor layer formed on a substantially square substrate with a dopant impurity;

a laser processing apparatus connected to said ion introducing apparatus through said vacuum chamber for treating said semiconductor layer with a laser light after said doping; and

a mechanism provided to said vacuum chamber for transporting said substantially square substrate from said ion introducing apparatus to said laser processing apparatus without exposing said substantially square substrate to the air,

said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates said non-single crystal silicon film.

51. The apparatus of claim 50, wherein said substantially square substrate is glass.

52. The apparatus of claim 50 wherein said substantially square substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

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53. The apparatus of claim 50, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

54. The apparatus of claim 50 wherein said laser processing apparatus further comprises a sample holder for moving said substrate in a direction orthogonal to said rectangular-shaped laser beam.

55. The apparatus of claim 50 wherein said laser processing apparatus further comprises a sample holder and said sample holder includes a heater for heating said substrate.

56. An apparatus for processing a semiconductor provided on a substrate comprising:

a vacuum chamber;

an ion introducing apparatus connected to said vacuum chamber for doping a semiconductor layer formed on a substantially square substrate with a dopant impurity;

a laser processing apparatus connected to said ion introducing apparatus through said vacuum chamber for treating said semiconductor layer with a laser light after said doping; and

a mechanism provided to said vacuum chamber for transporting said substantially square substrate from said ion introducing apparatus to said laser processing apparatus without exposing said substantially square substrate to the air,

said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates said non-single crystal silicon film and wherein said rectangular-

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shaped laser has a width greater than a width of said substantially square substrate.

Sub J 6) *10*
~~57.~~ The apparatus of claim ~~56~~¹⁰, wherein said substantially square substrate is glass.

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~~58.~~ The apparatus of claim ~~56~~¹⁰ wherein said substantially square substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

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~~59.~~ The apparatus of claim ~~56~~¹⁰, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

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Sub J 7) *10*
~~60.~~ The apparatus of claim ~~56~~¹⁰ wherein said laser processing apparatus further comprises a sample holder for moving said substrate in a direction orthogonal to said rectangular-shaped laser beam.

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~~61.~~ The apparatus of claim ~~60~~¹⁴ wherein said laser processing apparatus further comprises a sample holder and said sample holder includes a heater for heating said substrate.

62. An apparatus for processing a semiconductor provided on a substrate comprising:

a vacuum chamber;

an ion introducing apparatus connected to said vacuum chamber for doping a semiconductor layer formed on a substrate with a dopant impurity;

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a laser processing apparatus connected to said ion introducing apparatus through said vacuum chamber for treating said semiconductor layer with a laser light after said doping; and

a mechanism provided to said vacuum chamber for transporting said substrate from said ion introducing apparatus to said laser processing apparatus without exposing said substrate to the air,

said laser processing apparatus comprising a chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates the whole surface of the substrate including said non-single crystal silicon film.

Dt 63. The apparatus of claim 62, wherein said substrate is glass.

64. The apparatus of claim 62 wherein said substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

65. The apparatus of claim 62, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

66. The apparatus of claim 62 wherein said laser processing apparatus further comprises a sample holder for moving said substrate in a direction orthogonal to said rectangular-shaped laser beam.

67. The apparatus of claim 62 wherein said laser processing apparatus further comprises a sample holder and said sample holder includes a heater for heating said substrate.

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68. An apparatus for processing a semiconductor provided on a substrate comprising:

a vacuum chamber;

an ion introducing apparatus connected to said vacuum chamber for doping a semiconductor layer formed on a substrate with a dopant impurity;

a laser processing apparatus connected to said ion introducing apparatus through said vacuum chamber for treating said semiconductor layer with a laser light after said doping; and

a mechanism provided to said vacuum chamber for transporting said substrate from said ion introducing apparatus to said laser processing apparatus without exposing said substrate to the air,

said laser processing apparatus comprising a chamber, a gas inlet and exhaust means for controlling pressure and atmospheric composition within said chamber and a laser wherein a rectangular-shaped laser beam having an elongated cross-section irradiates said non-single crystal silicon film.

69. The apparatus of claim 68, wherein said substrate is glass.

70. The apparatus of claim 68, wherein said substrate is 300 mm x 400 mm and said rectangular-shaped laser beam is 2 mm x 350 mm.

71. The apparatus of claim 68, further including at least one thin-film transistor forming apparatus for forming a thin-film transistor.

72. The apparatus of claim 68, wherein said laser processing apparatus further comprises a sample holder for moving said substrate in a direction orthogonal to said rectangular-shaped laser beam.